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Date: March 2, 2015
To: Transportation Commission
From: Mark Poch, Traffic Engineering Manager
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Subject: LED Streetlight conversion project

Background

We are pleased to have the opportunity to brief the Transportation Commission on the recently approved LED streetlight conversion project, including benefits, concerns, budget, schedule, and public information plan. The City Council received a briefing on this project at the January 12, 2015 Study Session.

The LED streetlight conversion project will convert approximately half of the public streetlights in Bellevue to LED. The project is one of nine individual projects included in the Washington State Department of Commerce Energy Efficiency Grant, which was accepted by Council on December 8, 2014. Because this grant did not cover all of the costs associated with the LED conversion project, supplemental funds were requested as part of the Capital Investment Program update. Approval of the project, along with the needed additional funding, was accomplished as part of the adopted 2015-2021 Capital Investment Program on December 1, 2014, and is included in Capital Investment Program project PW-M-20 (Minor Capital – Signals and Lighting).

Scope

The LED streetlight conversion project consists of two parts:

1. Replacement of 4,066 of the approximately 5,600 Puget Sound Energy (PSE) owned high pressure sodium (HPS) streetlights with LED fixtures. The PSE streetlights are generally located in the residential areas of the city. PSE crews would do the installation work for this portion of the project.

2. Replacement of 176 City-owned HPS streetlights along a stretch of 148th Avenue NE from Main Street to Bel-Red Road and at freeway bridge undercrossing locations throughout the city. City crews would install these streetlights as part of the existing streetlight re-lamping program. It should be noted that the existing streetlights along this stretch of 148th Avenue NE are nearing the end of their useful life and need to be replaced.

Policy

Environmental Stewardship Initiative (ESI):
This project supports the ESI Strategic Plan 2013-2018, which encourages implementation of energy and water conservation retrofits and operational improvements for municipal facilities, street lights and traffic signals, and pump stations.

Comprehensive Plan:
The Environmental Element of the Comprehensive Plan sets the framework for environmental stewardship in Bellevue, and contains a stated goal of promoting a sustainable urban environment. Specifically, Policy EN-28 establishes the use of best management practices and technology in City projects to demonstrate effective environmental stewardship and long-term fiscal responsibility. Energy efficient lighting is provided in the element discussion as an example of environmental stewardship and best management practices.

Benefits and Other Considerations

LED street lighting has benefits over existing HPS street lighting as outlined below:

- Cost Savings: Because LED lights use less energy and last longer, energy and maintenance costs are reduced.
- Environmental Benefit: LED lights result in reduced greenhouse gas (GHG) emissions from producing less energy to run the lights and fewer service trips. Also, no mercury is used in the production of LED lights.
- Less Light Trespass: LEDs are point sources of light allowing for more exact lighting of desired areas with less light trespass (i.e. more light on the road and less on adjacent properties).
- Longer life: LED light fixtures have a 15-year useful life compared to 4-5 years for an existing HPS lamp.
- Management: LED lights come with features that allow for the future implementation of an adaptive street light system. Such a system would allow for remote detection of failures and ability to dim lights during certain hours for additional energy savings. These management features are available for City-owned streetlights and would still need to be developed as a future Intelligent Transportation Systems (ITS) project.

Though there are significant benefits to using LED street lighting, especially in the long-term, there are also some short-term considerations:

- Light temperature (color): LED lights produce a whiter light compared to HPS – with a color comparable to moonlight. The advantage of whiter light is it is easier for the human eye to distinguish details and colors. Generally, police prefer the whiter light and this is also the reason nearly all auto dealerships use white light. Despite these advantages, the City does occasionally hear from citizens that object to light that is not the yellow, "warm" light they are accustomed to.
- Glare: Since LED fixtures spread light differently than HPS fixtures, citizens have sometimes expressed concerns regarding glare from newly-

installed LED lights. This issue varies depending on fixture type and has improved as LED technology has developed.

- Initial cost: Typically, the initial cost of the LED streetlight is more than HPS lights. That higher initial cost is recovered and converted to cost savings over the life of the light. However, there are cases where a LED fixture is actually less costly than the HPS replacement. For example, the LED fixture that has been used to replace HPS shoebox streetlights on major arterials is about $650 compared with about $900 for the HPS.
- Risk: The implementation of any new technology comes with risks, especially for early implementers. For instance, the lower life cycle costs expected from LED are based on projections and not actual case studies because LED lighting is new. However, projections are based on standard testing procedures, and early indications are that projected life cycles will be met or exceeded.

The specific benefits associated with this project include:

- Annual energy cost savings of approximately $173,000
- Annual energy use reduction of 1,190,000 kWh
- Annual reduction of greenhouse gas emissions by 760 metric tons of carbon dioxide.

Budget

The total project cost is $1,100,612. This project is fully funded through Capital Investment Program project PW-M-20 (Minor Capital – Signals and Lighting). The total project cost will be offset by two revenue sources. The recently approved Energy Efficiency grant will return $265,732 to the City, and another $238, 916 will be returned from PSE rebates. The net project cost is therefore $595,964, and the project has a simple payback of only 3.4 years. Payback will be achieved from savings to the operating budget from reduced energy consumption.

Funding Source	Up Front Project Cost	Energy Efficiency Grant	PSE Rebate	Net Cost
Minor Capital – Streets & Lighting (CIP Plan No. PW-M-20)	1,100,612	(265,732)	(238,916)	595,964

Schedule

Intolight, Puget Sound Energy's street lighting branch, will be lead for constructing the replacement of the 4,066 PSE-owned streetlights included in this project. Intolight began construction on the project in late February. The project is anticipated to be completed sometime in 2016, and Intolight has indicated they believe they can get a majority of the project completed in 2015.

The replacement of the 176 City-owned lights is planned for 2015 and will be completed by the City's streetlight maintenance crew as part of the annual relamping program. Staff have finished most of the design work and most of the lights have been ordered.

Public Information Plan

Plan elements are as follows:

- Project website: The project website went live on January 12, 2015 and contains pertinent information including project scope, benefits, schedule, frequently asked questions, and contacts. An important feature of the website is the mapping that allows residents to see where lights are planned to be replaced on a street-by-street basis.
- *It's Your City*: Transportation included an article about the project, including the website address, in the February 2015 *It's Your City* newspaper.
- Social Media: Transportation plans to provide project information, media releases, and milestones on Twitter and Facebook.
- Press Releases: Press releases will be accomplished as appropriate to highlight key project milestones. All releases will highlight the project website. PSE is also anticipated to highlight this project with their own press releases.

Summary

The LED streetlight conversion project will convert about half of the City's streetlights to new LED technology, resulting in economic and environmental benefits. The project is fully funded, and costs will be offset by grant and rebate revenue. Once completed, and after the short payback period, the City is projected to save $173,000 annually in electricity costs while forwarding its environmental goals.

The Transportation Department has been keeping up with trends in solid state (LED) lighting since it was introduced, and has implemented a number of small LED projects starting as far back as 2008 to test products, evaluate benefits, and gage public acceptance. Other Washington cities have done major LED conversion projects successfully and, since our first test project in 2008, solid state lighting products have matured and the LED lighting revolution is now significantly underway. Although the Transportation Department does expect some opposing feedback from a few residents regarding light color or glare concerns, we feel this project can be implemented successfully and in a manner that realizes the expected benefits. With the revenue sources associated with this project, initial cost is significantly reduced and the payback period is very short.

Another anticipated benefit associated with this project is the partnership with Puget Sound Energy. PSE is very excited about joining forces with Bellevue to successfully implement this project and have been very proactive about lining up resources for 2015 implementation despite the uncertainty of whether this project would be funded as part of Bellevue's 2015-2021 CIP update. This will be the largest LED streetlight conversion project ever attempted by PSE, and they are eager to successfully complete the project in their hometown.